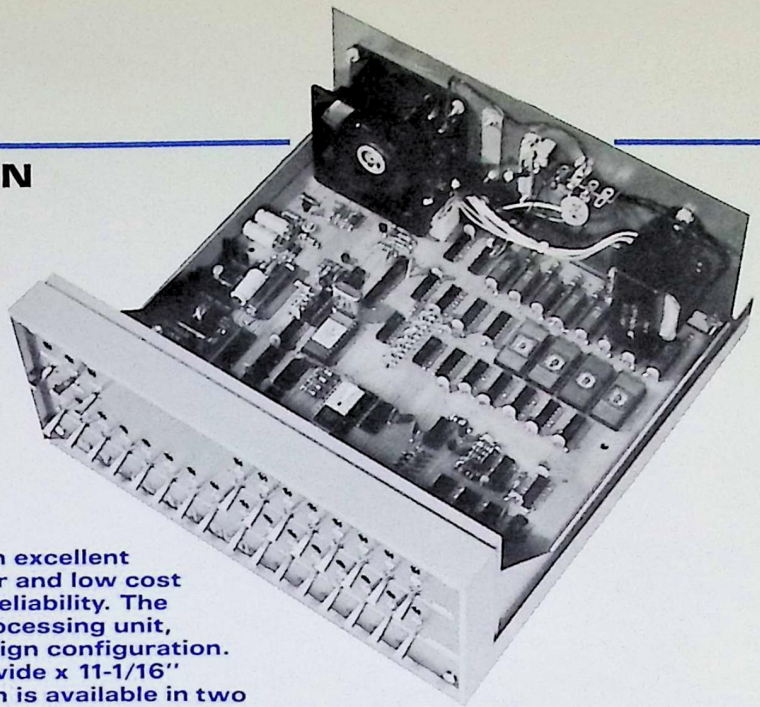
altair T.M. 680b

TECHNICAL INFORMATION



The ALTAIR 680b microcomputer is an excellent compromise between computer power and low cost structure, without sacrificing design reliability. The system is based on the 6800 microprocessing unit, which adapts nicely to a minimum design configuration. The ALTAIR 680b measures 11-1/16" wide x 11-1/16" deep x 4-11/16" high. The basic system is available in two configurations, depending on the intended application.

Almost all of the 680b circuitry is contained on a single large printed circuit board, including memory and a built-in I/O port. The full front panel model contains all of the controls necessary to program and operate the computer and includes an additional printed circuit board, which provides all of the logic circuitry necessary to reset, halt or start the processor. Also located on this board are switches and associated LED indicator lights for each of the sixteen address lines and eight data lines. The front panel circuit board mounts directly to the main printed circuit board via a 100-contact edge connector. The power switch is located on the back panel of the unit for safety purposes. A "turn-key" front panel model, which eliminates all control except restarting the processor, is also available.

The basic ALTAIR 680b computer can be subdivided into five functional sections. These are the MPU and clock, the memory, an I/O port, control and indication, and the power supply. The first three of these sections, along with the power supply regulation components, are located on the main printed circuit board.

At the heart of the 680b system is the 6800 Microprocessing Unit, which is largely responsible for the overall simplicity of the 680b design. The 6800 MPU contains three 16-bit registers and three 8-bit registers. The program counter is a two byte register which keeps track of the current address of the program. The stack pointer is also a two byte register which keeps track of the current address of the program and contains the next address in an external, variable length push-down/pop-up stack. The index register is a two byte register used to store data or a memory address for indexed addressing operations. There are two single byte accumulators used for holding operands and results from the arithmetic logic unit (ALU). The 8-bit condition code register indicates the results of an ALU operation. In this register there are two unused bits, kept at a logic one. The remaining six bits are used to indicate the status of the following: carry; half carry; overflow; zero; negative; interrupt.

The 6800 has seven different addressing modes, with the particular mode being a function of both the type of instruction and the actual coding within the instruction. The seven modes include the following: Accumulator Addressing—one byte instructions, specifying either of the two accumulators; Immediate Addressing—two or three byte instructions, with the MPU addressing the location given in the 2nd or 2nd and 3rd bytes when the immediate instruction is fetched; Direct Addressing—two byte instructions which allow the user to directly address the lowest 256 bytes of memory in the machine; Extended Addressing—three byte instructions, the second two bytes referring to an absolute address in memory for the operation; Indexed Addressing—two byte instructions, the second byte being added to the 16-bit index register to give the address of the operand; Implied Addressing—one byte instructions and the instruction itself gives the address; Relative Addressing—two byte instructions where the second byte is added to the lower 8 bits, allowing the user to address memory + 129 to -125 bytes from the location of the present instruction.

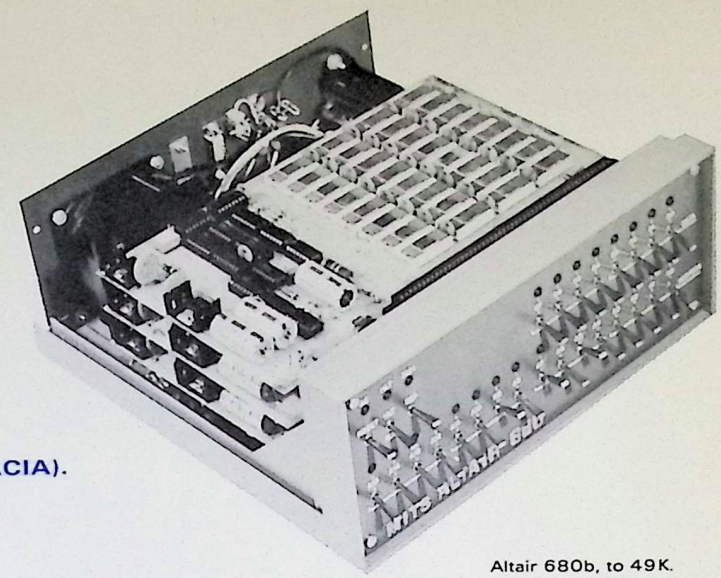
There are several timing and control signals required to operate the MPU. Two clock inputs are required, phase 1 and phase 2. These must be nonoverlapping and run at the Vcc voltage level. In the 680b the clock is a 2-MHz crystal controlled oscillator with logic to provide a 500-KHz two phase clock.

Sixteen active high address outputs are used to specify the sections of memory or I/O to be used. These can drive up to one standard TTL load and 130 pf. There are also eight bi-directional data lines with the same drive capability as the address lines.

NEW MEMORY FEATURES

MITS is pleased to announce the development of a 16K static memory card for the Altair 680b. With an access time of 215 nanoseconds and low power consumption of 5 watts, we feel that this is an excellent addition to the Altair 680b.

The 680b cabinet has room for up to three 16K static memory cards, thereby increasing the memory of the Altair 680b to 49K.



Altair 680b, to 49K.

SPECIAL FEATURES

PROM monitor.

1702A PROM monitor chip programmed so that you can immediately load and run paper tape object programs such as the text editor and assembler (see below).

Asynchronous Communication Interface Adapter (ACIA).

Allows the machine to transmit and receive a character at a time rather than one bit. Minimizes software needed for I/O routines. Contains crystal clock for baud rate synchronization. User-selectable for RS232, Baudot, TTY, 20ma current loop. Baud rates of 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, and 9600.

Two Pass Resident Assembler and Text Editor

A two pass resident assembler and text editor will be available for assembly language programming. This software is compatible with Motorola's format for assembly language programs, text and object files. 8K bytes of memory are required to run this package. The assembler produces a full assembly listing on the second pass, including the hex codes for the location counter and the instruction mnemonics. A symbol table listing is also produced. The text editor has full capabilities for text editing, including line insertion, printing, deletion and modification; as well as commands for changing one string of characters to another and for searching the text buffers for a particular character string.

Basic Interpreter

A BASIC interpreter has been developed which will be comparable to the 8800 8K BASIC interpreter.

Buffered Data Lines

All data lines are buffered to provide fanout capability of over 20 standard TTL loads.

Altair 680b
Specifications

No. of Boards	Up to 3 additional
Microprocessor	
Model	6800
Technology	NMOS
Data Word Size, Bits	8
Instruction Word Size, Bits	8
Clock Frequency,	500KHz
Add Time, Register to Register, Microsec. Per Data Word	2
Number of Instructions	72
Input/Output Control	
I/O Word Size, Bits	8
Number of I/O channels	256 Memory Address Locations Designated
Interrupt Capability	Std.
Type of Interrupt System	Maskable (Interrupt Request) and Non-maskable Interrupt
Software	
Resident Assembler and Editor	Yes
Higher-level language	BASIC
Monitor	Resident System Monitor on PROM
Complete Software Library Separately Priced	Yes

The Altair 680b is also available in this Turnkey Model which has a power indicator light and controls for RESET and RUN/HALT on the front panel. The system PROM monitor, when used in conjunction with a terminal, eliminates the necessity for toggling front panel switches to load bootstraps or to examine and change memory contents.

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